

U.S. Serial No. 10/658,204
Amendment
Response to OA dated January 26, 2005

Atty Docket: 740186-29

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Please amend the claims as follows:

1. (Currently Amended): A motor driving apparatus comprising:
 - a. driving circuit for driving a plurality of loads ~~contained in~~ from a plurality of motors; and
 - a control circuit for controlling the driving circuit to sequentially drive the plurality of the motors, wherein:
 - the driving circuit is provided with at least $n+1$ number of output terminals in order to connect thereto n (n : integer of 2 or larger) number of loads, each of the output terminals being led out from a node of a PNP type transistor and an NPN type transistor connected in series through the node in such a configuration that each pair of the output terminals adjacent to one another constitute a bridge circuit assigned to drive one load;
 - the control circuit turns on and off the PNP and NPN [type] transistors of the bridge circuit to thereby energize the load in either of a normal direction and a reverse direction;
 - a particular one of the output terminals is led from a node of a particular PNP type transistor and a particular NPN transistor, one of ~~which is~~ said PNP and NPN transistors being driven by a constant electric current through a feedback loop and the other of ~~which is~~ said PNP and NPN transistors being driven by a constant electric current through an open loop; and
 - the particular output terminal and another output terminal ~~adjacent thereto are paired to constitute~~ constituting a particular bridge circuit for driving a particular load by the constant electric current through either of the feedback loop and the open loop properly depending on whether the particular load is energized in the normal direction or the reverse direction.

2. (Original): The motor driving apparatus according to claim 1, wherein:
 - the feedback loop comprises a current detection resistor connected to the one of the particular PNP type transistor and the particular NPN transistor for detecting an electric current flowing therethrough, and an operational amplifier for controlling said one of the

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particular PNP type transistor and the particular NPN transistor based on an electric current detected by the current detection resistor; and

the open loop comprises a current mirror transistor that is mirror-connected to the other of the particular PNP type transistor and the particular NPN transistor, and a current setting resistor that is connected to the current mirror transistor for setting the constant electric current flowing therethrough.

3. (Original): The motor driving apparatus according to claim 2, wherein the driving circuit and the control circuit are integrated into one IC chip, so that the IC chip internally generates a reference voltage inputted to the operational amplifier of the feedback loop for setting the constant electric current, and the current setting resistor of the open loop is connected to the IC chip externally.

4. (Original): The motor driving apparatus according to claim 1, wherein the particular bridge circuit constituted of the particular output terminal drives as the particular load a motor contained in a digital camera for opening and closing a shutter in such a manner that the motor is driven by the constant electric current through the open loop when opening the shutter and driven by the constant electric current through the feedback loop when closing the shutter.

5. (Currently Amended): A lens-barrel driving apparatus for a camera, comprising:
a lens-barrel provided with a plurality of mechanisms for photographing by the camera, which are selected from shutter, diaphragm, auto focusing, and zooming mechanisms;
a plurality of motors that are integrated in order to drive the plurality of the mechanisms;
a driving circuit for driving a plurality of loads ~~contained in~~ from the plurality of the motors; and
a control circuit for controlling the driving circuit to sequentially drive the plurality of the motors, wherein:
the driving circuit is provided with at least $n+1$ number of output terminals in order to connect thereto n (n : integer of 2 or larger) number of loads, each of the output terminals

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being led out from a node of a PNP type transistor and an NPN type transistor connected in series through the node in such a configuration that each pair of the output terminals adjacent to one another constitute a bridge circuit assigned to drive one load;

the control circuit turns on and off the PNP and NPN [type] transistors of the bridge circuit to thereby energize the load in either of a normal direction and a reverse direction;

a particular one of the output terminals is led from a node of a particular PNP type transistor and a particular NPN transistor, one of ~~which is~~ said PNP and NPN transistors being driven by a constant electric current through a feedback loop and the other of which is said PNP and NPN transistors being driven by a constant electric current through an open loop; and

the particular output terminal and another output terminal ~~adjacent thereto are paired to constitute~~ constituting a particular bridge circuit for driving a particular load by the constant electric current through either of the feedback loop and the open loop properly depending on whether the particular load is energized in the normal direction or the reverse direction.